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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/629,993	08/01/2000	Hwai-Tzuu Tai	N81347/JDP	6792

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EXAMINER	
THOMPSON, JAMES A	

ART UNIT	PAPER NUMBER
2625	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/629,993	TAI ET AL.	
	Examiner	Art Unit	
	James A. Thompson	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The Declaration under 37 CFR 1.132 filed 03 July 2006 is insufficient to overcome the rejection of claims 23 and 24 based upon 35 USC §103(a) as set forth in the previous Office action, mailed 07 March 2006, because:

a. While Hwai-Tzuu Tai is indeed the inventor of US Patent 5,956,157, both Hwai-Tzuu Tai and Yee Ng are the inventors of the present claims, as set forth in the Declaration filed with the present application. Thus, while US Patent 5,956,157 was printed less than one year before the filing data of the present application, the present application and US Patent 5,956,157 are considered to have different inventive entities, and thus different inventors. Therefore, US Patent 5,956,157 is considered to be available prior art under 35 USC §102(a).

b. As set forth in the previous office action, mailed 07 March 2006, the edge enhancement process taught by Lee (US Patent 5,396,584), as applied to the Tai (US Patent 5,956,157), would simply take jagged edges that occur at areas of text or high-contrast data and perform the edge enhancement process shown in figures 2a-2b of Lee. Examiner does not believe that the effect posited by Dr. Tai in figures A and B of the present Declaration would occur in the case of modifying the Tai patent in view of the edge enhancement teachings of Lee that are set forth in said previous office action since there are no jagged edges in

figure A of the present Declaration. The edge enhancement taught by Lee is performed on jagged edges, and not smooth edges as shown in figure A of the present declaration. In fact, the added "bumps" and extensions beyond the original trace line shown in figure B of the present Declaration go against the teachings of Lee since Lee uses smaller sized dots so as to better conform to a smooth surface (see figures 2a-2b of Lee). The effect posited by Dr. Tai would require the extension of dots beyond the conformal boundary, either through the use of larger dots or the addition of dots, which is not an aspect of edge enhancement as taught by Lee.

In the example set forth by Dr. Tai in the present declaration, the edge enhancement performed according to the teachings of Lee would be nearly or wholly inoperative. It would be at other points in the resultant screened image which would be smoothed, namely areas in which jaggy occurs. While the system taught by the Tai patent which locally blends gray dot types surely performs well and produces a good result, Examiner does not believe that areas of text or high-contrast-edge data would be wholly without jaggy after the application of the system taught by the Tai patent. Thus, the edge enhancement set forth by Lee would provide additional enhancement in the cases in which there is text or high-contrast-edge data, and thus local jaggy. As stated before, and as set forth in said previous office action, the application of the edge enhancement taught by Lee would only occur in situations in which there is text or high-contrast-edge data.

Response to Arguments

2. Applicant's arguments filed 03 July 2006 have been fully considered but they are not persuasive.

Examiner has fully considered the present amendments to the claims and the newly added claims, which are addressed in detail in the prior art rejections set forth below. The arguments set forth in the present Declaration have been addressed above. The new grounds of rejection set forth below have been necessitated by the present amendments to the claims.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 23-24, 26, 28, 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tai (US Patent 5,956,157) in view of Lee (US Patent 5,396,584).

Regarding claim 23: Tai discloses:

- receiving image data that includes data representing a plurality of pixels (column 7, lines 49-58 of Tai), wherein each pixel of the plurality of pixels is associated with a location (column 7, lines 49-54 of Tai) and one of at least three intensities (column 7, lines 54-58 of Tai).
- accessing data in a memory, the data representing a screen (figure 8 and column 7, line 65 to column 8, line 5 of

Tai), the screen including a plurality of planes (figure 10A; and column 9, lines 39-41 and lines 50-56 of Tai), each plane of the plurality of planes including a plurality of cells (column 8, lines 41-45 of Tai), wherein each cell of the plurality of cells is associated with one of at least three microdot densities (column 8, lines 41-45 of Tai) being representative of a particular dot size capable of being printed by a gray-level printer (column 9, lines 43-50 of Tai).

- for each pixel (current pixel) of the plurality of pixels:
  - o determining the intensity and the location of the current pixel (column 7, lines 49-51 and lines 54-58 of Tai),
  - o selecting one of the plurality of planes based at least upon the current pixel's intensity (figure 10A; and column 9, lines 39-41 and lines 50-56 of Tai),
  - o associating one of the plurality of microdot densities in the selected plane with the current pixel (column 9, lines 43-51 of Tai) based at least upon the current pixel's location (column 7, lines 49-54 and column 9, lines 7-11 of Tai)
- outputting the microdot densities associated with the plurality of pixels as first gray-level data (column 8, lines 6-10 of Tai).
- blending the first gray-level data with second gray-level data resulting in blended-gray-level data (column 9, lines 41-50 of Tai), wherein the blending weights the first gray-level data and the second gray-level data depending upon characteristics (contrast index) of the image data (column 10, lines 21-30 of Tai).

- outputting the resultant blended-gray-level data (column 8, lines 14-21 of Tai).

Tai does not disclose expressly performing edge enhancement on portions of the blended-gray-level data that include text or high-contrast-edge data, thereby resulting in enhanced-blended-gray-level data.

Lee discloses performing edge enhancement on portions of screened image data that include text or high-contrast-edge data, thereby resulting in enhanced screened image data (figure 2a; figure 2b; and column 5, lines 40-49 of Lee).

Tai and Lee are combinable because they are from the same field of endeavor, namely gray level processing and digital gray level image data enhancement. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to additionally perform edge enhancement, as taught by Lee, upon the blended-gray-level data taught by Tai. The output data would then be enhanced-blended-gray-level data. The motivation for doing so would have been that, without edge enhancement, jagged edges are formed rather than straight edges when the pixels are actually printed on a printer (column 5, lines 40-42 of Lee). Thus, edge enhancement clearly provides superior results in gray level printing. Therefore, it would have been obvious to combine Lee with Tai to obtain the invention as specified in claim 23.

Regarding claim 24: **Tai discloses** an image processing apparatus (figure 6 of Tai) comprising:

- a memory storing data representing a screen (figure 8 and column 7, line 65 to column 8, line 5 of Tai), the screen including a plurality of planes (figure 10A; and column 9, lines 39-41 and lines 50-56 of Tai), each plane of the

plurality of planes including a plurality of cells (column 8, lines 41-45 of Tai), wherein each cell of the plurality of cells is associated with one of at least three microdot densities (column 8, lines 41-45 of Tai), the microdot densities being representative of a particular dot size capable of being printed by a gray-level printer (column 9, lines 43-50 of Tai). Since the data is clearly stored, some form of memory is inherent in the system of Tai.

- a first circuit (figure 6 (160(portion)) and column 7, lines 40-44 of Tai) configured at least to:
  - receive image data that includes data representing a plurality of pixels (column 7, lines 49-58 of Tai), wherein each pixel of the plurality of pixels is associated with a location (column 7, lines 49-54 of Tai) and one of at least three intensities (column 7, lines 54-58 of Tai).
  - for each pixel (current pixel) of the plurality of pixels:
    - determine the intensity and the location of the current pixel (column 7, lines 49-51 and lines 54-58 of Tai),
    - select one of the plurality of planes based at least upon the current pixel's intensity (figure 10A; and column 9, lines 39-41 and lines 50-56 of Tai),
    - associate one of the plurality of microdot densities in the selected plane with the current pixel (column 9, lines 43-51 of Tai) based at least upon the current pixel's location (column 7, lines 49-54 and column 9, lines 7-11 of Tai),

- output the microdot densities associated with the plurality of pixels as first gray-level halftone data (column 8, lines 6-10 of Tai).

- a second circuit (figure 6 (160(portion)) and column 7, lines 40-44 of Tai) configured at least to receive the image data and output second gray-level data (column 8, lines 48-54 of Tai).

→ At least a first gray-level data and a second gray-level data are generated, each corresponding to a separate screen (column 8, lines 48-54 of Tai). Since the unified rendering controller (figure 6(160) of Tai) performs the rendering of the scanned gray level image data (column 7, lines 40-44 of Tai) that the blending screen logic control (figure 6(150) of Tai) later blends (column 9, lines 41-50 of Tai), then the first circuit and the second circuit are physically embodied within the unified rendering controller. The first circuit and the second circuit each correspond to their respective portions of the unified rendering controller, such as specific physical circuitry or specific physically-embodied software that is executed by a processor.

- a blending circuit (figure 6(150) of Tai) communicatively connected to the first circuit and the second circuit (as clearly shown in figure 6 of Tai) and configured at least to blend the first gray-level data with second gray-level data, thereby resulting in blended-gray-level data (column 9, lines 41-50 of Tai), wherein the blending performed by the blending circuit weights the first gray-level data and the second gray-level data depending upon characteristics

(contrast index) of the image data (column 10, lines 21-30 of Tai).

- an output circuit (figure 6(180) of Tai) communicatively connected to the image buffer (figure 6 (140) of Tai) and configured at least to output the resultant blended-gray-level data (column 8, lines 14-21 of Tai).

Tai does not disclose expressly an edge enhancement circuit communicatively connected to the blending circuit and configured to at least perform edge enhancement on portions of the blended-gray-level data that include text or high-contrast-edge data, thereby resulting in enhanced-blended-gray-level data.

Lee discloses an edge enhancement circuit configured at least to perform edge enhancement on portions of screened image data that include text or high-contrast-edge data, thereby resulting in enhanced screened image data (figure 2a; figure 2b; and column 5, lines 40-49 of Lee).

Tai and Lee are combinable because they are from the same field of endeavor, namely gray level processing and digital gray level image data enhancement. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to additionally perform edge enhancement, as taught by Lee, upon the blended-gray-level data taught by Tai. The output data would then be enhanced-blended-gray-level data. Furthermore, the edge enhancement circuit would have to be communicatively connected to the blending circuit in order to properly function, and the output circuit would have to be communicatively connected to the edge enhancement circuit since edge enhancement is the operation that occurs immediately prior to output. The motivation for doing so would have been that, without edge enhancement, jagged edges are formed rather than straight edges

when the pixels are actually printed on a printer (column 5, lines 40-42 of Lee). Thus, edge enhancement clearly provides superior results in gray level printing. Therefore, it would have been obvious to combine Lee with Tai to obtain the invention as specified in claim 24.

Regarding claims 26 and 30: Tai discloses that the screen in a halftone screen (column 8, lines 42-48 of Tai).

Regarding claims 28 and 32: Tai discloses that the first gray-level data and the second gray-level data are color matched, structure matched, density matched, or combinations thereof (figure 8 and column 8, lines 48-67 of Tai). The blending operation (figure 8 and column 8, lines 48-67 of Tai) naturally produces structure and density matching of the first gray level data and the second gray level data.

5. **Claims 25 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tai (US Patent 5,956,157) in view of Lee (US Patent 5,396,584) and Crean (US Patent 5,745,249).**

Regarding claims 25 and 29: Tai discloses that the screen in a halftone screen (column 8, lines 42-48 of Tai).

Tai in view of Lee does not disclose expressly that said halftone screen is specifically a multilevel stochastic halftone screen.

Crean discloses using a multilevel stochastic halftone screen (column 9, lines 64-66 and column 10, lines 48-52 of Crean).

Tai in view of Lee is combinable with Crean because they are from the same field of endeavor, namely gray level image data screening and screen control. At the time of the invention, it would have been obvious to a person of ordinary

skill in the art to specifically use a multilevel stochastic halftone screen, as taught by Crean. The motivation for doing so would have been that, as is well-known in the art, a stochastic halftone screen provides for improved dispersion of the dots in halftone printing. Therefore, it would have been obvious to combine Crean with Tai in view of Lee to obtain the invention as specified in claims 25 and 29.

6. Claims 27 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tai (US Patent 5,956,157) in view of Lee (US Patent 5,396,584) and obvious engineering design choice.

Regarding claims 27 and 31: Tai discloses that the blending step blends low contrast (screen 1), medium-to-low contrast (screen 2), low and medium-to-low contrast (screens 1 and 2), midtone (screen 3), medium-to-low contrast and midtone (screens 2 and 3), high-contrast (screen 4), or midtone and high-contrast (screens 3 and 4) regions of an image (column 8, lines 48-65 and column 10, lines 27-36 of Tai).

It would have been an obvious engineering design choice to blend only midtone, high-contrast, or midtone and high-contrast regions of an image since the low contrast and medium-to-low contrast screens do not create a high contrast which would then be greatly affected by a blending operation. Eliminating the blending operations with respect to the low contrast and medium-to-low contrast regions would not substantially degrade the resultant image, and would greatly decrease the amount of processing required to render the output image. Thus, one of ordinary skill in the art at the time of the invention would have made an engineering design choice to blend only midtone, high-contrast, or midtone and high-contrast regions of an image

if high-throughput were a greater concern than image quality, since the image quality would only suffer slightly while the throughput would be greatly enhanced by the elimination of blending with respect to low contrast and medium-to-low contrast regions of the image.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be

reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

James A. Thompson
Examiner
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11 September 2006

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